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germ cells. Some mother cells do not contain them, but it could not be demonstrated that these have fewer ordinary chromosomes than the others. The number of chromosomes in *O. lata* is fourteen; in the hybrid with *O. Lamarckiana* it is "probably twenty"; and in pure *O. Lamarckiana* the number, as yet undetermined, is thought to vary. Since a different number of chromosomes in closely related species has apparently never before been recorded, these observations if they are verified by further investigations are of great interest. The author dismisses the idea that *O. Lamarckiana* is itself a hybrid, but this also is an important subject for further study. He concludes that the mutations of *O. Lamarckiana* probably arise during the reduction divisions, and that the pollen grains which give rise to mutants may differ in their chromatin morphology from the ordinary pollen of the plant.

J. A. HARRIS

Variation and Differentiation.— Dr. Pearl has recently published an exhaustive study of the intra-individual variation and differentiation in Ceratophyllum.[1] The purpose of the author was "to work out as exactly and completely as possible for a particular organism the laws according to which post-embryonic differentiation and growth occur." The characters considered are (a) the number of leaves per whorl; (b) the position of the whorl on the plant; (c) the size of the various divisions of the plant; and (d) the position of the branches. It is found that the mean number of leaves per whorl is greatest on the main stem and decreases on the primary, secondary, tertiary and quaternary branches. The variability — measured by both the standard deviation and the cœfficient of variation, on the other hand, increases on the branches of the first and second order to fall again on those of the third and fourth order. The skewness also seems to increase in the negative direction from the main stem outward but the shortness of the material does not permit of the determination of this point by analytical methods beyond the secondary branches. A marked correlation is found between the position of the whorl on the stem and the number of leaves. The number of leaves increases from the base to the tip of the axis but the increase cannot be represented by the slope of a straight line — in biometric terminology, regression is not linear — or by a parabola. The increase is, however,

[1] Pearl, R. Variation and Differentiation in Ceratophyllum. *Carnegie Institution of Washington*, 1907, Publ. 58, 136 pp., 26 figs., 2 pl.

well represented by a logarithmic curve. This is the first law of growth in Ceratophyllum and may be stated as follows: "On any axial division of the plant the mean number of leaves per whorl increases with each successive whorl in such a way that both the absolute increment and the rate of increase diminish as the distance (in units of nodes) of the whorl from a fixed point increases."

The second law of growth is that of diminishing variability. The whorls of leaves produced by a growing point are formed with ever increasing fidelity to type. "The growing point appears to be influenced in its morphogenetic activity by its previous experience."

To the students of evolution, who are now concerning themselves primarily with experimental and statistical investigations of variation and heredity, the importance of such a detailed study of intra-individual variation, correlation and differentiation will be apparent. In the original paper they will find a wealth of analyzed material.

J. A. HARRIS

Cotton.— *Its Cultivation, Marketing, Manufacture, and the Problems of the Cotton World.* By Charles William Burkett, Professor of Agriculture, North Carolina College of Agriculture and Mechanic Arts, and Clarence Hamilton Poe.[1]— This volume of over three hundred pages is interesting from many points of view. Its illustrations are reproductions in a sepia tone of much effectiveness and the contrasts, especially in the case of white cotton bolls are very pleasing. Moreover many of the sketches are likely to be of permanent interest as matters of record, notably those which give some notion of fast-vanishing methods of carding, spinning, and weaving cotton by hand. The authors have spared no pains to make the illustrations attractive and useful, and they have succeeded admirably. The text is clearly written, throughout, and it is well-arranged with respect to convenience of reference. Moreover, the facts as regards the botany, the agriculture, and the commercial relations of the cotton-plant, are carefully stated in such a manner as to be quite within the reach of the general reader, but we miss what ought never to be lacking in any book of reference,— an index. The value of this useful treatise would be enhanced tenfold by a copious alphabetical and subject index.

G. L. GOODALE

Notes. — Three new species of Dendromecon are described by Fedde in *Repertorium Novarum Specierum* of Jan. 15.

[1] New York, Doubleday, Page & Company.